

WHAT IS CLAIMED IS:

1. Seed of soybean line designated 0509237, representative seed of said line having been deposited under ATCC Accession No. PTA-_____.
2. A soybean plant, or a part thereof, produced by growing the seed of claim 1.
3. A tissue culture of regenerable cells produced from the plant of claim 2.
4. Protoplasts produced from the tissue culture of claim 3.
5. The tissue culture of claim 3, wherein cells of the tissue culture are from a tissue selected from the group consisting of leaf, pollen, embryo, root, root tip, anther, pistil, flower, seed, pod, and stem.
6. A soybean plant regenerated from the tissue culture of claim 3, said plant having all the morphological and physiological characteristics of line 0509237, representative seed of said line having been deposited under ATCC Accession No. PTA-_____.
7. A method for producing an F1 hybrid soybean seed, comprising crossing the plant of claim 2 with a different soybean plant and harvesting the resultant F1 hybrid soybean seed.
8. A hybrid soybean seed produced by the method of claim 7.
9. A hybrid soybean plant, or parts thereof, produced by growing said hybrid seed of claim 8.
10. A method for producing a male sterile soybean plant comprising transforming the soybean plant of claim 2 with a nucleic acid molecule that confers male sterility.
11. A male sterile soybean plant produced by the method of claim 10.
12. A method of producing an herbicide resistant soybean plant comprising transforming the soybean plant of claim 2 with a transgene that confers herbicide resistance.
13. An herbicide resistant soybean plant produced by the method of claim 12.
14. The soybean plant of claim 13, wherein the transgene confers resistance to an herbicide selected from the group consisting of: imidazolinone, sulfonylurea, glyphosate, glufosinate, L-phosphinothricin, triazine and benzonitrile.
15. A method of producing an insect resistant soybean plant comprising transforming the soybean plant of claim 2 with a transgene that confers insect resistance.
16. An insect resistant soybean plant produced by the method of claim 15.

17. The soybean plant of claim 16, wherein the transgene encodes a *Bacillus thuringiensis* endotoxin.

18. A method of producing a disease resistant soybean plant comprising transforming the soybean plant of claim 2 with a transgene that confers disease resistance.

19. A disease resistant soybean plant produced by the method of claim 18.

20. A method of producing a soybean plant with modified fatty acid metabolism or modified carbohydrate metabolism comprising transforming the soybean plant of claim 2 with a transgene encoding a protein selected from the group consisting of stearyl-ACP desaturase, fructosyltransferase, levansucrase, alpha-amylase, invertase and starch branching enzyme.

21. A soybean plant produced by the method of claim 20.

22. A soybean plant, or part thereof, having all the physiological and morphological characteristics of the line 0509237, representative seed of said line having been deposited under ATCC Accession No. PTA-_____.

23. A method of introducing a desired trait into soybean line 0509237 comprising:

- (a) crossing 0509237 plants grown from 0509237 seed, representative seed of which has been deposited under ATCC Accession No. PTA-_____, with plants of another soybean line that comprise a desired trait to produce F1 progeny plants, wherein the desired trait is selected from the group consisting of male sterility, herbicide resistance, insect resistance, and disease resistance;
- (b) selecting F1 progeny plants that have the desired trait to produce selected F1 progeny plants;
- (c) crossing the selected progeny plants with the 0509237 plants to produce backcross progeny plants;
- (d) selecting for backcross progeny plants that have the desired trait and physiological and morphological characteristics of soybean line 0509237 listed in Table 1 to produce selected backcross progeny plants; and
- (e) repeating steps (c) and (d) one or more times in succession to produce selected second or higher backcross progeny plants that comprise the desired trait and all of the physiological and morphological characteristics of

soybean line 0509237 listed in Table 1 as determined at the 5% significance level when grown in the same environmental conditions.

24. A plant produced by the method of claim 23, wherein the plant has the desired trait and all of the physiological and morphological characteristics of soybean line 0509237 listed in Table 1 as determined at the 5% significance level when grown in the same environmental conditions.

25. The plant of claim 24 wherein the desired trait is herbicide resistance and the resistance is conferred to an herbicide selected from the group consisting of: imidazolinone, sulfonylurea, glyphosate, glufosinate, L-phosphinothricin, triazine and benzonitrile.

26. The plant of claim 24 wherein the desired trait is insect resistance and the insect resistance is conferred by a transgene encoding a *Bacillus thuringiensis* endotoxin.

27. The plant of claim 24 wherein the desired trait is male sterility and the trait is conferred by a cytoplasmic nucleic acid molecule that confers male sterility.

28. A method of modifying fatty acid metabolism or modified carbohydrate metabolism into soybean line 0509237 comprising:

- (a) crossing 0509237 plants grown from 0509237 seed, representative seed of which has been deposited under ATCC Accession No. PTA-_____, with plants of another soybean line that comprise a nucleic acid molecule encoding an enzyme selected from the group consisting of phytase, stearyl-ACP desaturase, fructosyltransferase, levansucrase, alpha-amylase, invertase and starch branching enzyme;
- (b) selecting F1 progeny plants that have said nucleic acid molecule to produce selected F1 progeny plants;
- (c) crossing the selected progeny plants with the 0509237 plants to produce backcross progeny plants;
- (d) selecting for backcross progeny plants that have said nucleic acid molecule and physiological and morphological characteristics of soybean line 0509237 listed in Table 1 to produce selected backcross progeny plants; and
- (e) repeating steps (c) and (d) one or more times in succession to produce selected second or higher backcross progeny plants that comprise said nucleic acid molecule and have all of the physiological and morphological

characteristics of soybean line 0509237 listed in Table 1 as determined at the 5% significance level when grown in the same environmental conditions.

29. A plant produced by the method of claim 28, wherein the plant comprises the nucleic acid molecule and has all of the physiological and morphological characteristics of soybean line 0509237 listed in Table 1 as determined at the 5% significance level when grown in the same environmental conditions.